# Spacecraft Bus Overview

**Mark Johnson**
**Program Manager**
**NRL**
**202-404-5328**
**johnson@ssdd.nrl.navy.mil**

# Spacecraft Bus Requirements

- Place Instrument in Proper Orbit
  - GTO ® GEO Operations
- Provide Services for Instrument to Collect Science Data
  - Stable Attitude and Spin Rate
    - Most Difficult FAME Requirements
  - Power, Structure, Thermal, etc.
  - Processing to Initialize / Operate Instrument
    - Provide Attitude / Spin Rate to Instrument for Acquisition
  - Data Collection
  - Transmission to Ground System
- Provide Ability to "De-Orbit" Upon Completion of Mission

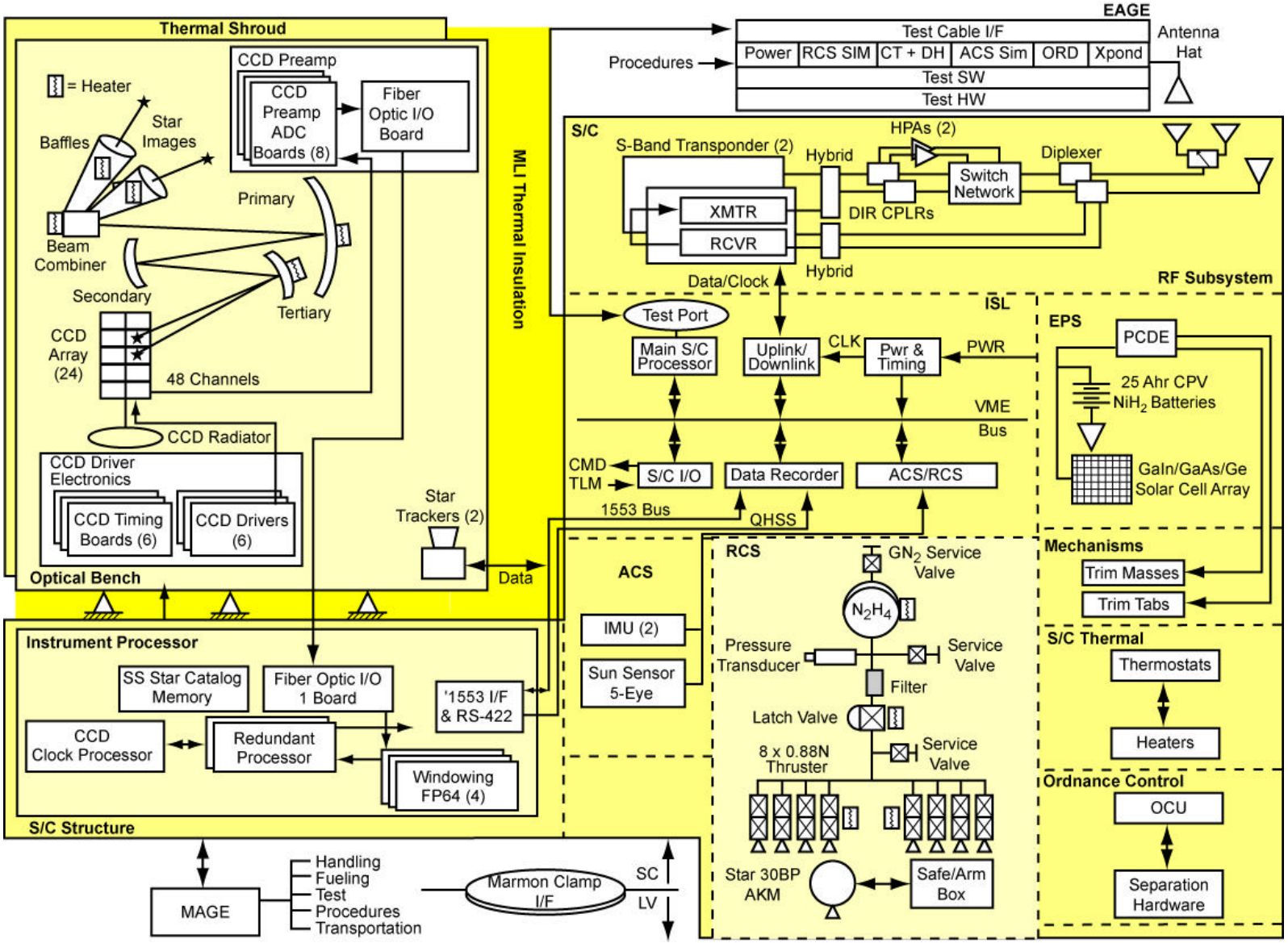
# S/C Bus Error Budget Rqmts (1 of 2)

- Control Solar Precession Rate (4.5 Pixels Cross-Scan [1 Pixel = .206 Arcsec])
  - Approach Is to Adjust Precession Rate With Trim Tabs to Remove Residual Errors From Optical Property Variations, Sun Shield Sweep Angle, Thermal Radiation Effects and CG Offset
- Gravity Gradient (1/2 [TBR] Pixel Cross-Scan)
  - Limit Ratio of Moments of Inertia to Minimize Affect of Gravity Torque
- Magnetic Torques (1/2 [TBR] Pixel Cross-Scan)
  - Limit Residual Spacecraft Magnetic Dipole to Minimize Affect of Magnetic Field
- Alignment Errors
  - FPA to Spin Axis (1 Pixel)
    - Use of Trim Masses to Adjust / Align Spin Axis With CCDs to Remove Residual Fabrication Misalignments (FPA to Instrument, Instrument to Bus, S/C Moments of Inertia, Spin Balance Errors)
  - Nutation (1 Pixel)
    - Nutation Damping Required to Eliminate Fuel Slosh and Errors Due to Initial Spin Conditions (Thruster Misalignment)

# S/C Bus Error Budget Rqmts (2 of 2)

- **Jitter**
  - **Minimize/Eliminate Jitter to allow Star Centroiding**
    - **In-Scan**
      - **1 Hz** — **1/100th of a Pixel**
      - **10 Hz** — **1/33rd of a Pixel**
      - **100 Hz** — **1/10th of a Pixel**
    - **Cross-Scan**
      - **1 Hz** — **1/10th of a Pixel**
      - **10 Hz** — **1/3rd of a Pixel**
      - **100 Hz** — **1 Pixel**
- **Stable Spin Rate**
  - **Thermally Stable Spacecraft to Minimize Short Term Variations Is Spin Rate**
  - **Sun Shield Optically Uniform / Stable to Minimize Long Term Changes to the Spin Rate**

# Spacecraft Block Diagram



# Spacecraft Bus Exploded View